WHAT IS CLAIMED IS:

1. An implantable port comprising:

a body having a flow passage therethrough, said flow passage having an upstream end and a downstream end, wherein at least a portion of the upstream end is adapted to sealingly engage an access tube which is inserted into said upstream end; and

a pressure-responsive valve element positioned in the flow passage downstream from the upstream portion so that an access tube can be fully inserted into said upstream portion without engaging the valve component, wherein the valve component is closed in the absence of a differential pressure above a threshold level.

2. An implantable port as in claim 1, wherein said body comprises a housing and a housing insert coupled to said housing.

3. An implantable port as in claim 2 wherein said insert comprises a compliant material defining a portion of the flow passage.

4. An implantable port as in claim 2 wherein said insert comprises a nipple element containing said pressure-responsive valve.

5. An implantable port as in claim 2 wherein said portion of the upstream end of the housing adapted to sealingly engage the access tube has a radial stiffness greater than a radial stiffness of said access tube.

6. An implantable port as in claim 2 wherein said housing comprises stainless steel.

7. An implantable port as in claim 2 wherein the housing defines a first portion of the passage and the insert defines a second portion of the passage.

8. An implantable port as in claim 7 wherein the first portion of the passage has a distal opening with a diameter smaller than a diameter of the access tube.

9. An implantable port as in claim 2 wherein the housing defines a first portion of the passage and a catheter coupled to the port defines a second portion of the passage.

10. An implantable port as in claim 1, wherein the downstream end of the flow passage is disclosed at about a 90° angle relative to the upstream end which receives the access tube.

11. An implantable port as in claim 1 wherein the passage does not have a needle guide channel coupled to the body and upstream of the upstream end of the passage.

12. An implantable port as in claim 1, wherein said valve element comprises a pressure-responsive slit valve.

13. An implantable port as in claim 1, wherein said valve element comprises an articulating, pressure-responsive leaflet valve.

14. An implantable port as in claim 1 wherein the flow passage further comprises a catheter coupled to said body wherein said catheter has a lumen fluidly coupled to said passage in the body.

15. An implantable port as in claim 14 wherein the catheter defines the downstream end of the flow passage and the valve element is located at a distal tip of the catheter.

16. An implantable port as in claim 1, wherein the threshold valve of the differential pressure is between about 0.25 and 25.0 psi.

17. A method for delivering a substance to a subcutaneous target site, said method comprising:

percutaneously introducing an access tube to an implanted port having a flow passageway with an upstream end, a downstream end, and a valve element in the flow passageway, wherein the access tube is introduced to seat in the passage but does not engage the valve element; and

introducing said substance into the flow passage through the access tube at a pressure sufficient to open the valve element to permit flow through the flow passageway to the target site.

18. A method as in claim 17 further comprising repeatedly accessing the implanted port with said access tube through the same access tract at intervals and over a time period sufficient to cause scar tissue formation over the access tract.

19. A method as in claim 17 further comprising locating said implanted port by manually aligning the access tube with a line from the skin entry point of an access tract to the aperture on the port.

20. A method as in claim 17 further comprising locating the port by annually feeling the port to determine the position of the aperture.

21. A method as in claim 17, wherein the access tube is introduced through a skin layer having a thickness in the range from 3 mm to 20 mm.

22. A method as in claim 17, wherein the access tube comprises a blunt cannula.

23. A method as in claim 17, wherein the introducing step comprises orienting the access tube generally vertically with respect to the skin surface.

24. A kit comprising:

a subcutaneously implantable port according to claim 1;

instructions for implanting the port comprising implanting a port in a subcutaneous tissue pocket, wherein an access cannula-receiving aperture of the port is disposed beneath an intact region of skin, and introducing a penetrating element through the intact region of skin into the aperture, wherein the element remains anchored in the aperture for a time sufficient to create an access tract; and

a package adapted to contain the port and the instructions for use.

25. A kit as in claim 18, further comprising a penetrating element.

26. A kit as in claim 19, wherein the penetrating element comprises a syringe needle.